What is claimed is:

1. A system for operating an array antenna, the array antenna having a plurality of antenna elements, comprising:

a feeding port;

a plurality of signal shifters for respective connection to the plurality of antenna elements; and

an adaptive beamformer configured to distribute input signals from the feeding port to the plurality of signal shifters and to combine output signals from the plurality of signal shifters for output to the feeding port in a plurality of operating modes, the plurality of operating modes being associated with respective array antenna gain patterns having different beamwidths.

2. The system of claim 1, wherein the adaptive beamformer comprises a plurality of beamformers, each beamformer distributing input signals from the feeding port to, and combining output signals from, particular ones of the plurality of signal shifters.

3. The system of claim 2, wherein the plurality of beamformers comprises a first beamformer for distributing input signals from the feeding port to, and combining output signals from, each of the plurality of signal shifters, and a second beamformer for distributing input signals from the feeding port to, and combining output signals from, a subset of the plurality of signal shifters.

4. The system of claim 3, wherein the subset of the plurality of signal shifters comprises signal shifters for connection to two centre antenna elements of the plurality of antenna elements.

5. The system of claim 2, wherein the adaptive beamformer further comprises an input switch connected to the feeding port and to the plurality of beamformers for switching signals between any one of the plurality of beamformers and the feeding port.

6. The system of claim 3, wherein the adaptive beamformer further comprises:

an input switch connected to the feeding port and to the plurality of beamformers; and

a plurality of switches connected to the first beamformer and the second beamformer and respectively connected to each signal shifter in the subset of the plurality of signal shifters, each of the plurality of switches operable to connect each signal shifter in the subset of the plurality of signal shifters to either the first beamformer or the second beamformer.

7. The system of claim 1, further comprising:

a signal weight calculator configured to calculate signal weights for steering a gain pattern of the array antenna and to output the signal weights to the signal shifters.

8. The system of claim 7, implemented in a network node of a distributed wireless access network, wherein the signal shifters are phase shifters, and wherein the signal weights are phase weights calculated to steer a gain peak in the gain pattern of the array antenna in a direction of a neighbouring network node in the distributed wireless access network.

9. The system of claim 8, wherein the network node further comprises a memory storing a lookup table comprising phase weights for steering the gain peak in the gain pattern of the array antenna in a direction of each neighbouring network node of the network node.

10. The system of claim 7, implemented in a network node of a distributed wireless access network, wherein the signal shifters are combined amplitude and phase shifters, and wherein the signal weights are complex weights comprising amplitude components and phase components calculated based on a location of an interference source in the distributed wireless access network to steer a null in the gain pattern of the array antenna in a direction of the interference source.

11. The system of claim 7, implemented in a network node of a distributed wireless access network, wherein the signal shifters are combined amplitude and phase shifters, and wherein the signal weights are complex weights comprising

amplitude components and phase components calculated to steer a null in the gain pattern of the array antenna in a direction of an interference source in the distributed wireless access network and to steer a gain peak in the gain pattern of the array antenna in a direction of a neighbouring network node in the distributed wireless access network.

12. The system of claim 1, wherein the array antenna comprises a patch array antenna, and wherein the plurality of antenna elements comprises a plurality of columns of radiating elements.

13. The system of claim 1, wherein the plurality of operating modes comprises at least a first operating mode associated with a first array antenna gain pattern having a first beamwidth and a second operating mode associated with a second array antenna gain pattern having a second beamwidth narrower than the first beamwidth.

14. The system of claim 13, implemented in a network node of a distributed wireless access network, the network node having at least one neighbouring network node, wherein the adaptive beamformer operates in the first operating mode to scan for communication requests from the at least one neighbouring node of the network node, and in the second operating mode for communicating with the at least one neighbouring node.

15. A network node for a distributed wireless access network, comprising:

a steerable array antenna having a plurality of antenna elements and configurable beamwidth for establishing wireless transit radio links with neighbouring network nodes in the distributed wireless access network;

a plurality of signal shifters for respective connection to the plurality of antenna elements; and

an adaptive beamformer for distributing array antenna input signals to the plurality of signal shifters and combining array antenna output signals from the plurality of signal shifters in at least a wide beamwidth operating mode associated with an array antenna gain pattern having a first beamwidth and a narrow beamwidth operating mode associated with an array antenna gain pattern having a second beamwidth narrower than the first beamwidth.

16. The network node of claim 15, wherein the adaptive beamformer comprises at least a first beamformer for distributing input signals to and combining output signals from a subset of the plurality of signal shifters in the wide beamwidth operating mode, and a second beamformer for distributing input signals to and combining output signals from each of the plurality of signal shifters in the narrow beamwidth operating mode.

17. The network node of claim 15, wherein the signal shifters are phase shifters, further comprising:

a phase weight calculator configured to calculate phase weights for steering a gain peak in the array antenna gain pattern having the second beamwidth toward one of the neighbouring nodes, and to output the phase weights to the phase shifters in the narrow bandwidth operating mode.

18. The network node of claim 15, wherein the signal shifters are phase shifters, further comprising:

a complex weight calculator configured to calculate complex weights comprising phase weights and amplitude weights for steering a null in the array antenna gain pattern having the second beamwidth toward an interference source in the distributed wireless access network, and to output the phase weights to the phase shifters and the amplitude weights to the second beamformer in the narrow bandwidth operating mode.

19. The network node of claim 15, wherein the array antenna is operated in the wide beamwidth operating mode during a listening function to scan the neighbouring network nodes and in the narrow beamwidth operating mode during a communication function over a wireless transit radio link.

20. A method of operating an array antenna in a wireless communication network, the array antenna having configurable beamwidth, comprising:

listening for communication requests using a first beamwidth of the array antenna;

receiving a communication request identifying a destination wireless access routing point in the wireless communication network;

forming a beam having a second beamwidth narrower than the first beamwidth;

directing the formed beam toward the destination wireless access routing point; and

transmitting communication signals over the formed beam to the destination wireless access routing point.

21. The method of claim 20, wherein the array antenna comprises a plurality of antenna elements, and listening comprises exciting a subset of the plurality of antenna elements.

22. The method of claim 21, wherein forming comprises exciting each of the plurality of antenna elements.

23. The method of claim 20, wherein directing comprises:

accessing a lookup table to retrieve phase shifts for the plurality of antenna elements to steer the formed beam toward the destination wireless access routing point; and

applying the phase shifts to respective excitation signals of the plurality of antenna elements.

24. The method of claim 22, wherein directing comprises:

calculating phase shifts for the plurality of antenna elements to steer the formed beam toward the destination wireless access routing point; and

applying the phase shifts to respective excitation signals of the plurality of antenna elements.

25. The method of claim 20, further comprising:

determining a location of an interferer; and

directing a null toward the interferer.

26. The method of claim 25, wherein determining a location of an interferer comprises accessing a lookup table to retrieve a bearing angle of the interferer.

27. The method of claim 25, wherein determining a location of an interferer comprises scanning a wireless access area.

28. The method of claim 25, wherein directing a null toward the interferer comprises:

calculating phase shifts and amplitude shifts for the plurality of antenna elements to steer the null toward the interferer; and

applying the phase shifts and the amplitude shifts to respective excitation signals of the plurality of antenna elements.

29. A system for operating an array antenna element in a wireless communication network, comprising:

means for exciting the array antenna to form a beam having a first beamwidth to listen for communication requests;

means for receiving a communication request identifying a destination wireless access routing point in the wireless communication network;

means for exciting the array antenna to form a beam having a second beamwidth narrower than the first beamwidth, and for directing the formed beam toward the destination wireless access routing point; and

means for transmitting communication signals over the beam having the second beamwidth to the destination wireless access routing point.

30. A distributed wireless access network, comprising:

a plurality of network access nodes; and

a plurality of wireless transit radio links between the network access nodes,

wherein at least one of the network access nodes comprises an electronically steerable high gain array antenna with configurable beamwidth for establishing wireless transit links with neighbouring network access nodes.

31. The network of claim 30, wherein at least one of the network access nodes is connected to a broadband wireline backbone connection.

32. The network of claim 30, wherein the beamwidth of the array antenna is controlled by different excitations of the array antenna.

33. The network of claim 30, wherein the array antenna comprises a plurality of diversity transceivers.

34. The network of claim 33, wherein the diversity transceivers are dual polarized diversity transceivers, and wherein beams for each polarization direction of the diversity transceivers are steered independently.

35. The network of claim 30, wherein the beamwidth of the array antenna is configurable to provide decreased probability of interference.